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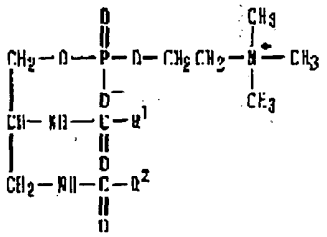
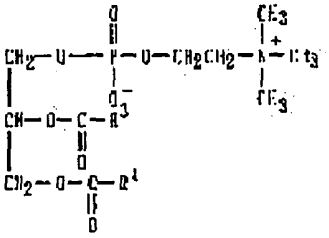
(54) TASTE-RELATED PROTEIN EXTRACTANT

(57)Abstract:
PURPOSE: To obtain a taste-related protein extractant capable of extracting a taste-related protein which exists on the tongue and plans an important role in manifestation of sweetness, flavor, etc., and of changing taste sensitivity of the tongue.
CONSTITUTION: This taste-related protein extractant comprises a suspension of liposome containing an amide bond-containing phosphatidylcholine of formula I (R1 and R2 are 8-24C alkyl or 8-24C alkenyl), preferably 1,2-dimyristoylamido-1,2-deoxyphosphatidylcholine(DDPC). The suspension of liposome comprises the compound of formula I and a phospholipid for forming an ordinary liposome, preferably a phosphatidylcholine of formula II (R3 and R4 are R1 and R2) such as egg yolk lecithin or dimyristoylphosphatidylcholine(DMPC) and a mixture of DDPC and egg yolk lecithin or DMPC in the molar ratio of 4:6 may be cited as the suspension of liposome. The extractant is brought into contact with the surface of epithelium of the tongue to extract a taste-related protein existing on the surface of epithelium of the tongue.



I



II

LEGAL STATUS

[Date of request for examination]

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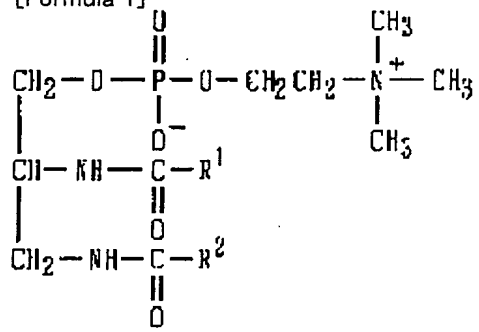
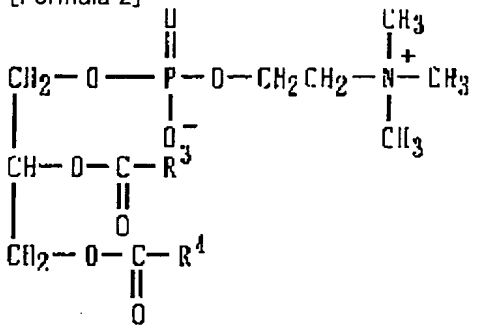
CLAIMS

[Claim(s)]
[Claim 1] The following general formula (1)
[Formula 1]



(1)

It is the gustation intervention protein extractant which consists of the liposome suspension containing the phosphatidylcholine which has amide combination expressed with (R1 and R2 show the alkyl or alkenyl machine of carbon numbers 8-24 among a formula).
[Claim 2] Furthermore, liposome suspension is the following general formula (2).
[Formula 2]



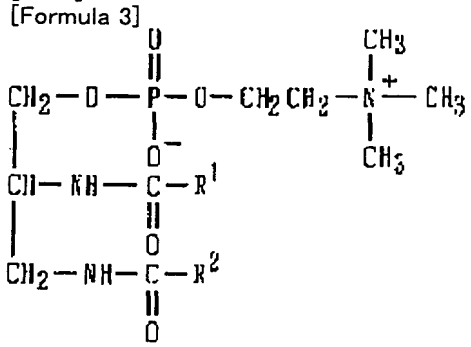
(2)

It is the gustation intervention protein extractant according to claim 1 which is a thing containing the phosphatidylcholine expressed with (R3 and R4 show the alkyl or alkenyl machine of carbon numbers 8-24 among a formula).
[Claim 3] How to extract the gustation intervention protein which carries out actual [of contacting a gustation intervention protein extractant according to claim 1 or 2 on a tongue epithelium front face] to the tongue epithelium front face by which it is characterized.
[Claim 4] The measuring method of gustation sensitivity change characterized by measuring potential change of a glossopharyngeal nerve before and after contacting a gustation intervention protein extractant according to claim 1 or 2 on a tongue epithelium front face.

[Translation done.]

DETAILED DESCRIPTION

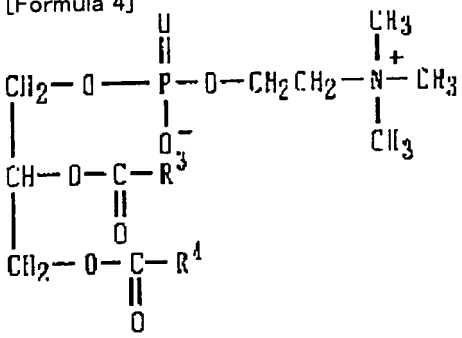
[Detailed Description of the Invention]
[0001]
[Field of the Invention] Actual [of this invention] can be carried out on a tongue, it can extract the gustation intervention protein which is playing the role important for a manifestation of sweet taste, ******, etc., and relates to the extraction technique using the gustation intervention protein extractant and this to which the gustation sensitivity of a tongue can be made to change.
[0002]
[Description of the Prior Art] As matter which stimulates the taste cells on a tongue, an acid, a salt, a bitter substance, the sweet taste matter, the ****** matter (amino acid), etc. are known. Among these, a salty taste, acidity, and bitterness are called taste which these causative agents acted and discover to a tongue top lipid membrane. For example, about the relation between a bitter substance and a tongue top lipid membrane, since the response threshold to the various bitter substances of asolectin liposome and human being's gustatory threshold show good functionality, it turns out that the acceptance site of the bitter substance in taste cells is the same hydrophobic site as a lipid dyad layer [a layer (MEMBRANE) and 13(3).144-151 (1988)].
[0003] Based on this knowledge, about the bitter substance, the acid, and the salt, a common lipid dyad layer is used and the research is advanced.
[0004] On the other hand, if a tongue is processed by the proteolytic enzyme, since a nervus response will disappear about sweet taste and a taste, a specific receptor protein minds [the sweet taste matter and / taste], and it is thought that the response is discovered.
[0005] However, this tongue top protein exists in a tongue front face, since it is a membrane protein further, the extraction is difficult, and the research is seldom progressing.
[0006]
[Problem(s) to be Solved by the Invention] Therefore, it was difficult to have made the gustation sensitivity of the tongue about sweet taste and the taste matter change except for the case where a proteolytic enzyme is used. Therefore, the purpose of this invention tends to offer the technique of extracting gustation intervention protein, tends to give change to the gustation sensitivity of a tongue, and tends to use for uptake adjustment of the sweet taste matter etc.
[0007]
[Means for Solving the Problem] When contacting on the tongue the liposome suspension which contains the phosphatidylcholine expressed with the following general formula (1) as a result of this invention persons' inquiring zealously in view of ** or ******, gustation intervention protein could be extracted, after the extraction, it found out that the gustation about sweet taste and a taste decreased, and this invention was completed.
[0008] That is, this invention is the following general formula (1).
[0009]
[Formula 3]



(1)

[0010] The gustation intervention protein extractant which consists of the liposome suspension containing the phosphatidylcholine which has amide combination expressed with (R1 and R2 show the alkyl or alkenyl machine of carbon numbers 8-24 among a formula) is offered. Moreover, the technique of extracting the gustation intervention protein which carries out actual [of this invention contacting the concerned gustation intervention protein extractant on a tongue epithelium front face] to the tongue epithelium front face by which it is characterized is offered. Furthermore, the measuring method of gustation sensitivity change characterized by this invention measuring potential change of a glossopharyngeal nerve before and after contacting the concerned gustation intervention protein extractant on a tongue epithelium front face is offered again.
[0011] R1 of the phosphatidylcholine which has amide combination expressed with the general formula (1) used by this invention And R2 Although the carbon numbers of the alkyl or alkenyl machine shown are 8-24, especially the thing of 10-20 is desirable. Specifically, a lauroyl machine, a myristoyl machine, a PAL ******** machine, etc. are desirable. As phosphatidylcholine which has a desirable amide combination especially, DDPC (1,2-dimyristoylamide-1,2-deoxyphosphatidyl choline) is mentioned. Moreover, the phosphatidylcholine (1) which has

amide combination can be manufactured by technique given in JP,61-267509,A.
[0012] This phosphatidylcholine (1) and technique better known than the usual phospholipid for liposome formation, for example, a representation target, can manufacture the liposome suspension in this invention according to a vortex process (Vortexing method or Hydration method) [Bangham, A.D., Standish, H.H.& Hatkins, J.C.J.Hol.Biol., 13,238 (1965)]. Although lipids, such as lecithin more specifically extracted and refined from a soybean, the yolk, etc. as the above-mentioned phospholipid for liposome formation and a sphingomyelin, and the synthetic lipid which has dipeptide combination near the polar head are mentioned, it is the following general formula (2).
[0013]
[Formula 4]



(2)

[0014] The phosphatidylcholine expressed with (R3 and R4 show the alkyl or alkenyl machine of carbon numbers 8-24 among a formula), for example, yolk lecithin, dimyristoyl phosphatidyl choline (DMPC), etc. are desirable.
[0015] As desirable combination of the phosphatidylcholine (1) which has amide combination, and the usual phospholipid for liposome formation, what set DDPC, yolk lecithin, or DDPC and DMPC to about 4:6 (mole ratio) is mentioned. The liposome suspension carried out and obtained can be used as a gustation intervention protein extractant like the above.
[0016] This extraction can be carried out by contacting the above-mentioned liposome suspension on a tongue epithelium front face. What is necessary is just to specifically repeat and pour out liposome suspension on a tongue. Although the tongue applied here is organum gustus to which protein participates in the tongue of an animal, and a gustation manifestation, in especially this invention, its tongue of a mammal, an amphibian, a reptile, birds, and fishes is desirable. Moreover, the amount of the liposome suspension used to a tongue is very important about the amount of extraction protein, for example, it is desirable to add 10ml of the liquid with which DDPC:DMPC=4:6 [5mg] are contained in 1ml of liposome suspension to the tongue of one ****, and it is desirable to add 30ml of the liquid with which DDPC:DMPC=4:6 [15-45mg] are contained in the Homo sapiens.
[0017] The gustation intervention protein carried out and extracted like the above is reconstructed on the liposome, with activity held, and this can be used as the gustation and a gustation intervention protein research, for example, an artificial-membrane taste sensor etc.
[0018] Moreover, before and after contacting the liposome suspension and the tongue epithelium front face of this invention, change of a gustation sensitivity can be measured by measuring potential change of a glossopharyngeal nerve. Since a salt and bitterness come to be sensed strong by using the liposome suspension of this invention before a meal as a collutory, it stops sensing a saccharinity further by the ability reducing the salt in food and sweet taste food becomes unsavory, the application side that the ingestion of sweet taste food can be checked is also considered.

[0019]
[Effect of the Invention] The extract which the gustation intervention protein extractant of this invention can extract easily the gustation intervention protein which participates in a manifestation of the sweet taste on a tongue, ******, etc., and was obtained can be used for a research of gustation intervention protein. Furthermore, change of a gustation sensitivity can be known by measuring potential change of a glossopharyngeal nerve, before and after contacting the gustation intervention protein extractant of this invention on a tongue epithelium front face. On the other hand, by blending with the mouthwash etc., the gustation intervention protein extractant of this invention can change the gustation sensitivity of a tongue, and can also expect effects, such as sweet taste matter ingestion suppression.
[0020]
[Example] Although an example is given and this invention is explained still in detail hereafter, this invention is not limited to these.
[0021] According to technique (W.S.Singleton, H.S.Gray, H.L.Brown, J.L.White, J.Am.Oil Chem.Soc., and [42, 53] (1965)) given in reference, the yolk phosphatidylcholine (EggPC) was extracted from the example 1 yolk, and it refined using the alumina column. The purity was checked by TLC. Moreover, DDPC was compounded from 2 and 3-diamino propionic acid by technique given in JP,61-267509,A [Junzo Sunamoto et al., the Chemical Society of Japan, 1987 (3), p 569-574]. 10.6mg of the above-mentioned EggPC and 7.0mg of DDPC were mixed, and it was made to melt into 2ml chloroform in an eggplant type flask. It distilled off under reduced pressure of chloroform using the rotating evaporator, and overnight neglect was further carried out in the vacuum desiccator. Subsequently, on the vortex mixer, 1ml of PBS (pH7.38) was made to swell the obtained liquid, and it was stirred. Then, using the UR200P probe type ultrasonic-wave crusher (made in Tommy), the ultrasonic irradiation was carried out to the bottom of a nitrogen gas draft by 0 degree C and 25W for 5 minutes, and desired liposome suspension was obtained.
[0022] Example 2 It anesthetizes at extraction:**** of ****** top protein (urethane anesthetization), and a tongue is pulled out from the inside of an oral cavity, and a gustation sensing side is turned up and it fixes. Then, the liposome suspension to which 1 hour repeat deed tongue top gustation intervention protein reconstructed the operation which adds with a dropper 10ml of the liposome aqueous solutions which contain 5mg of the lipids of DDPC:DMPC=4:6 in 1ml on a tongue, receives this solution with a laboratory dish on the reverse side of a tongue, inhales this solution with a dropper, and is added on a tongue was obtained.

[0023] Example 3 The silver-silver chloride electrode was connected with the glossopharyngeal nerve of effect:**** of the liposome for a tongue top protein extraction, gustation response change was measured as nervus potential change, and measured value was compared before and after performing liposome processing shown in the example 2 for 1 hour. The result is shown in drawing 1 - view 4 . About the shoe cloth and 1-alanine which are a sweet taste component, the clear decrement was seen immediately after processing from the drawing 1 and the drawing 2 compared with nervus potential variation's at the time of carrying out gustation stimulus processing before. Then, as a result of separating the liposome in the obtained liposome suspension and carrying out determination of the amount of extraction proteins in a liposome using a fluorescence indicator (full run), it checked that 133microg [/ml] protein was extracted.

[0024] Example 4 The after [analysis] comparison study of the protein which could wash the tongue by ion exchange water before the liposome extract mentioned as the analysis:example 2 of extraction protein and the liposome extraction was carried out by SDS-PAGE. The result is shown in the drawing 5 and the drawing 6 . From drawing, a difference is clearly accepted in the amount (60 or more KDs) of macromolecules, and it became clear that protein is extracted by liposome suspension.

[0025] example 5 alternative masking [of the gustation by optimization of an extraction condition]: -- generally a salt, an acid, and bitterness are called taste acted and discovered to a tongue top lipid membrane, and it is thought that it is the taste which acts on the receptor protein considered that ****** and a taste exist on a tongue, and is discovered Then, the liposome extraction method which does not damage a tongue top lipid but mainly extracts the receptor protein on a tongue was examined using the liposome mentioned as the example 2. A result is shown in drawing 7 . Consequently, when extracting by making extraction time into 30 minutes, it turns out that only sweet taste can be alternatively masked about immediately after an extraction.

[Translation done.]

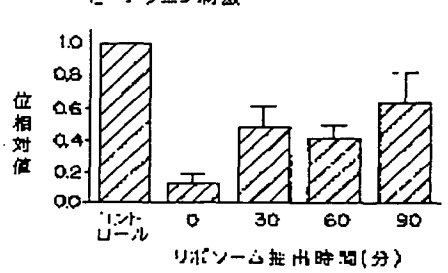
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] In an example 3, it is drawing in which being before and after processing of this invention extractant, and showing the variation of the nervus potential at the time of carrying out L-alanine stimulus.
[Drawing 2] In an example 3, it is drawing in which being before and after processing of this invention extractant, and showing the variation of the nervus potential at the time of carrying out a shoe cloth stimulus.
[Drawing 3] In an example 3, it is drawing in which being before and after processing of this invention extractant, and showing the variation of the nervus potential at the time of carrying out a quinine hydrochloride stimulus.
[Drawing 4] In an example 3, it is drawing in which being before and after processing of this invention extractant, and showing the variation of the nervus potential at the time of carrying out L-leucine stimulus.
[Drawing 5] In an example 4, it is drawing showing the analysis result of the protein which washed and obtained the tongue by ion exchange water.
[Drawing 6] In an example 4, it is drawing showing the analysis result of the extracted protein by this invention extractant.
[Drawing 7] In an example 5, it is drawing showing the result of alternative masking of the gustation by this invention extractant.

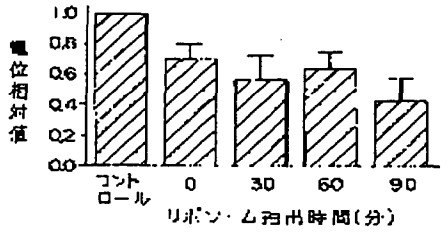
[Translation done.]

DRAWINGS

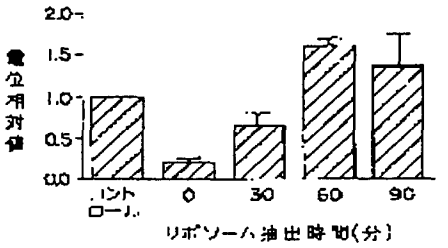
[Drawing 1]



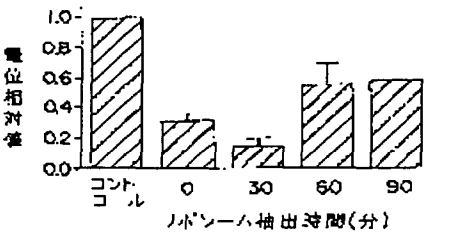
[Drawing 2]



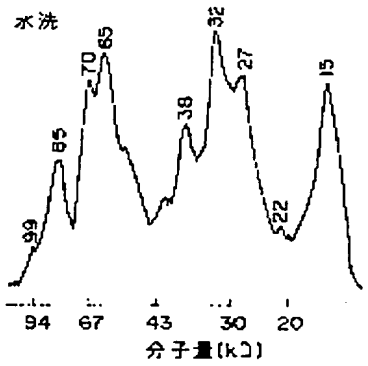
[Drawing 3]



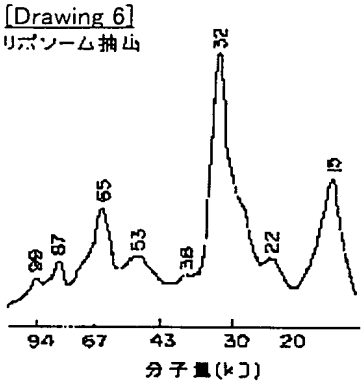
[Drawing 4]



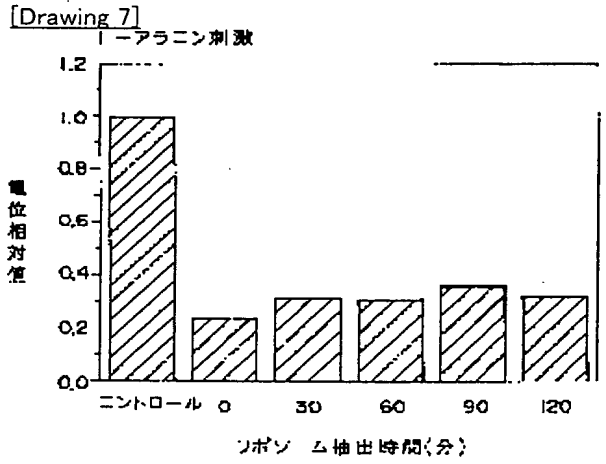
[Drawing 5]



[Drawing 6]



[Drawing 7]



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C07F 9/10		Z 9155-4H		
G01N 27/333				
27/327				
			G01N 27/30 331 N	

審査請求　未請求　請求項の数４　ＯＬ　（全５頁）　最終頁に続く

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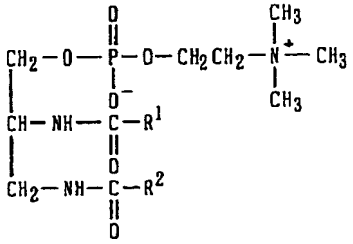
(54)【発明の名称】味覚関与蛋白質抽出剤

(57)【要約】
【構成】　下記一般式（１）
【化１】



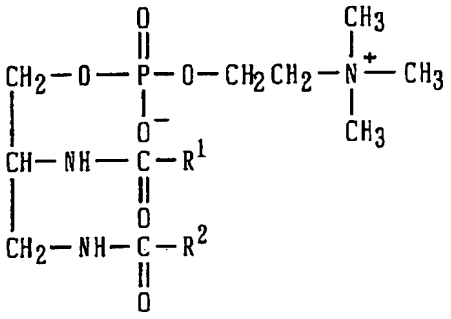
（１）

（式中、R' 及びR² は炭素数８～２４のアルキル又はアルケニル基を示す）で表わされるアミド結合を有するホスファチジルコリンを含むリポソーム懸濁液からなる味覚関与蛋白質抽出剤。
【効果】　舌上の甘味、うまみ等の発現に関与する味覚関与蛋白質を容易に抽出することができる。

【特許請求の範囲】

【請求項１】　下記一般式（１）

【化１】

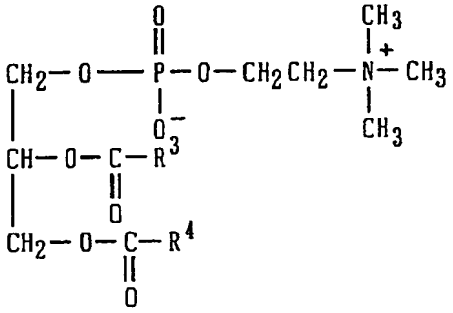


（１）

（式中、R¹ 及びR² は炭素数８～２４のアルキル又はアルケニル基を示す）で表わされるアミド結合を有するホスファチジルコリンを含むリポソーム懸濁液からなる味覚関与蛋白質抽出剤。

【請求項２】　更に、リポソーム懸濁液が次の一般式（２）

【化２】



（２）

（式中、R³ 及びR⁴ は炭素数８～２４のアルキル又はアルケニル基を示す）で表わされるホスファチジルコリンを含むものである請求項１記載の味覚関与蛋白質抽出剤。

【請求項３】　請求項１又は２記載の味覚関与蛋白質抽出剤を舌上皮表面に接触させることを特徴とする舌上皮表面に顕在する味覚関与蛋白質を抽出する方法。

【請求項４】　請求項１又は２記載の味覚関与蛋白質抽出剤を舌上皮表面に接触させる前後で舌咽神経の電位変化を測定することを特徴とする味覚感受性変化の測定方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、舌上に顕在し、甘味、うまみ等の発現に重要な役割を演じている味覚関与蛋白質を抽出することができ、舌の味覚感受性を変化せしめることができる味覚関与蛋白質抽出剤及びこれを用いた抽出方法に関する。

【０００２】

【従来の技術】舌上の味細胞を刺激する物質としては、

酸、塩、苦味物質、甘味物質、うまみ物質（アミノ酸）等が知られている。このうち、塩味、酸味、苦味はこれらの原因物質が舌上脂質膜へ作用して発現する味と言われている。例えば、苦味物質と舌上脂質膜への関係について、アゾレクチンリポソームの各種苦味物質に対する応答閾値と人間の味覚閾値とが良い相関性を示すことから、味細胞における苦味物質の受容サイトは、脂質２分子膜と同様な疎水性部位であることが判っている〔膜（ＭＥＭＢＲＡＮＥ），１３（３），１４４－１５１，（１９８８）〕。

【０００３】この知見に基づき、苦味物質、酸、塩については、一般的な脂質２分子膜を利用し、研究が進められている。

【０００４】一方、甘味、うま味については、舌を蛋白質分解酵素で処理すると神経応答が消失することから、甘味物質、うま味物質に特異的な受容蛋白質が介して応答が発現していると考えられている。

【０００５】しかしながら、この舌上蛋白質は、舌表面に存在し、更に膜蛋白質であることから抽出が困難であり、研究はあまり進んでいない。

【０００６】

【発明が解決しようとする課題】従って、蛋白質分解酵素を使用する場合を除いて、甘味、うま味物質についての舌の味覚感受性を変化せしめることは、困難であった。よって、本発明の目的は、味覚関与蛋白質を抽出する方法を提供し、舌の味覚感受性に変化を与え、甘味物質等の摂取調節等に役立てようとするものである。

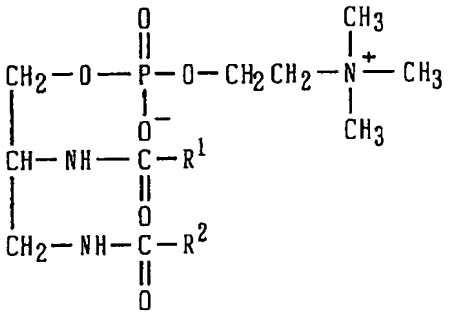
【０００７】

【課題を解決するための手段】斯かる実情に鑑み本発明者らは鋭意研究を行なった結果、下記一般式（１）で表わされるホスファチジルコリンを含むリポソーム懸濁液を舌上に接触させれば、味覚関与蛋白質が抽出でき、抽出後、甘味、うま味に関する味覚が減少することを見出し本発明を完成した。

【０００８】すなわち本発明は、下記一般式（１）

【０００９】

【化３】



（１）

【００１０】（式中、R¹ 及びR² は炭素数８～２４のアルキル又はアルケニル基を示す）で表わされるアミド結合を有するホスファチジルコリンを含むリポソーム懸

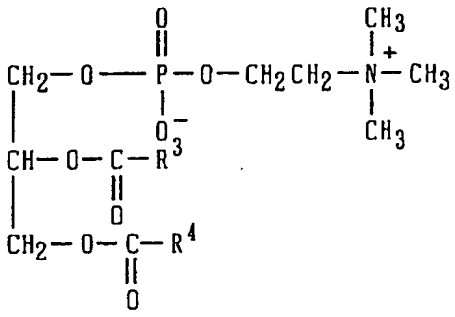
濁液からなる味覚関与蛋白質抽出剤を提供するものである。また、本発明は当該味覚関与蛋白質抽出剤を舌上皮表面に接触させることを特徴とする舌上皮表面に顕在する味覚関与蛋白質を抽出する方法を提供するものである。更にまた本発明は当該味覚関与蛋白質抽出剤を舌上皮表面に接触させる前後で舌咽神経の電位変化を測定することを特徴とする味覚感受性変化の測定方法を提供するものである。

【００１１】本発明で用いる一般式（１）で表わされるアミド結合を有するホスファチジルコリンのR' 及びR' で示されるアルキル又はアルケニル基の炭素数は８～２４であるが、特に１０～２０のものが好ましい。具体的にはラウロイル基、ミリストイル基、パルミトイル基等が好ましい。特に好ましいアミド結合を有するホスファチジルコリンとしてはＤＤＰＣ（１，２－ジミリストイルアミド－１，２－デオキシホスファチジルコリン）が挙げられる。また、アミド結合を有するホスファチジルコリン（１）は、特開昭６１－２６７５０９号公報に記載の方法により製造することができる。

【００１２】本発明におけるリポソーム懸濁液は、このホスファチジルコリン（１）と通常のリポソーム形成用リン脂質より、公知の方法、例えば代表的にはボルテックス法（Ｖｏｒｔｅｘｉｎｇ ｍｅｔｈｏｄ又はＨｙｄｒａｔｉｏｎ ｍｅｔｈｏｄ）〔Ｂａｎｇｈａｍ，Ａ．Ｄ．，Ｓｔａｎｄｉｓｈ，Ｈ．Ｈ．＆ Ｈａｔｋｉｎｓ，Ｊ．Ｃ．Ｊ．Ｈｏｌ．Ｂｉｏｌ．，１３，２３８（１９６５）〕に従って製造することができる。上記リポソーム形成用リン脂質としては、より具体的には例えば、大豆、卵黄等から抽出、精製されたレシチン、スフィンゴミエリン等の脂質、極性頭部近くにジペプチド結合を有する合成脂質が挙げられるが、次の一般式（２）

【００１３】

【化４】



（２）

【００１４】（式中、R³ 及びR⁴ は炭素数８～２４のアルキル又はアルケニル基を示す）で表わされるホスファチジルコリン、例えば、卵黄レシチン、ジミリストイルホスファチジルコリン（ＤＭＰＣ）等が好ましい。

【００１５】アミド結合を有するホスファチジルコリン（１）と通常のリポソーム形成用リン脂質の好ましい組合せとしては、ＤＤＰＣと卵黄レシチン又はＤＤＰＣとＤＭＰＣとを約４：６（モル比）としたものが挙げられる。上記の如くして得られたリポソーム懸濁液は、味覚関与蛋白質抽出剤として用いることができる。

【００１６】この抽出は、上記リポソーム懸濁液を舌上皮表面に接触させることにより実施することができる。具体的にはリポソーム懸濁液を舌上に繰り返し注げばよい。ここで適用される舌は、動物の舌及び味覚発現に蛋白が関与する味覚器であるが、本発明では、哺乳類、両生類、爬虫類、鳥類及び魚類の舌が特に好ましい。また、舌に対するリポソーム懸濁液の使用量は、抽出蛋白質量に関して非常に重要であり例えば、牛蛙一頭の舌に対してリポソーム懸濁液１ml中にＤＤＰＣ：ＤＭＰＣ＝４：６が５mg含まれる液を１０ml添加するのが好ましく、ヒトではＤＤＰＣ：ＤＭＰＣ＝４：６が１５～４５mg含まれる液を３０ml添加するのが好ましい。

【００１７】上記の如くして抽出された味覚関与蛋白質は、活性を保持したままリポソーム上に再構築されており、これは味覚及び味覚関与蛋白質研究、例えば人工膜味センサー等として利用できる。

【００１８】また、本発明のリポソーム懸濁液と舌上皮表面を接触させる前後で、舌咽神経の電位変化を測ることにより味覚感受性の変化を測定することができる。本発明のリポソーム懸濁液は、例えばうがい剤として食事前に使用することにより、塩及び苦味が強く感じられるようになるので、食品中の食塩を減らすことができ、更に、甘さを感じなくなるため、甘味食品がまずくなるので甘味食品の摂食を阻害することができるという応用面も考えられる。

【００１９】

【発明の効果】本発明の味覚関与蛋白質抽出剤は、舌上の甘味、うまみ等の発現に関与する味覚関与蛋白質を容易に抽出することができ、また、得られた抽出物は味覚関与蛋白の研究に用いることができる。更に本発明の味覚関与蛋白質抽出剤を舌上皮表面に接触させる前後で舌咽神経の電位変化を測定することにより味覚感受性の変化を知ることができる。一方、本発明の味覚関与蛋白質抽出剤は、うがい薬等に配合することにより、舌の味覚感受性を変化させることができ、甘味物質摂食抑制等の効果も期待できる。

【００２０】

【実施例】以下、実施例を挙げて本発明を更に詳細に説明するが本発明は、これらに限定されるものではない。

【００２１】実施例１

卵黄から文献記載の方法〔Ｗ．Ｓ．Ｓｉｎｇｌｅｔｏｎ，Ｈ．Ｓ．Ｇｒａｙ，Ｈ．Ｌ．Ｂｒｏｗｎ，Ｊ．Ｌ．Ｗｈｉｔｅ，Ｊ．Ａｍ．Ｏｉｌ Ｃｈｅｍ．Ｓｏｃ．，４２，５３（１９６５）〕に従い卵黄ホスファチジルコリン（ＥｇｇＰＣ）を抽出し、アルミナカラムを用いて精製した。その純度はＴＬＣにより確認した。また、２，３－ジアミノプロピオン酸から特開昭６１－２６７

５０９号公報〔砂本順三ら、日本化学会誌、１９８７（３）、ｐ５６９－５７４〕記載の方法により、ＤＤＰＣを合成した。上記ＥｇｇＰＣの１０．６mgとＤＤＰＣの７．０mgとを混合し、ナス型フラスコ中で2mlのクロロホルム中に溶解させた。ロータリーエバポレーターを用いてクロロホルムを減圧下に留去し、更に減圧デシケーター中で一夜放置した。次いで得られた液をボルテックスミキサー上でＰＢＳ（pH７．３８）の1mlに膨潤させ、攪拌した。その後、ＵＲ２００Ｐプローブ型超音波破砕機（トミー社製）を用いて、窒素ガス気流下に５分間、０℃、２５Ｗで超音波照射して、所望のリポソーム懸濁液を得た。

【００２２】実施例２　　牛蛙舌上蛋白質の抽出：牛蛙に麻酔（ウレタン麻酔）を施し舌を口腔内より引き出し味覚感知面を上にして固定する。続いて1ml中にＤＤＰＣ：ＤＭＰＣ＝４：６の脂質5mgを含むリポソーム水溶液１０mlをスポイドにより舌上に添加し、舌の裏でこの溶液をシャーレにより受けこの溶液をスポイドで吸い舌上に添加する操作を１時間繰り返し行ない舌上味覚関与蛋白質の再構築したリポソーム懸濁液を得た。

【００２３】実施例３　　舌上蛋白質抽出用リポソームの効果：牛蛙の舌咽神経に銀・塩化銀電極を繋ぎ味覚応答変化を神経電位変化として測定し、実施例２に示したリポソーム処理を１時間施した前後で測定値を比較した。その結果を図１～図４に示す。図１及び図２より甘味成分であるシュークロース及びＬ－アラニンについては、味覚刺激した場合の神経電位変化量が処理前に比べ処理直後では明らかな減少がみられた。続いて得られたリポソーム懸濁液中のリポソームを分離し、リポソーム中の抽出蛋白量を蛍光指示薬（フルラン）を用いて定量した結果、１３３μｇ／mlの蛋白質が抽出されていることを確認した。

【００２４】実施例４　　抽出蛋白質の分析：実施例２に挙げたリポソーム抽出液とリポソーム抽出前に舌をイオン交換水で洗浄し得た蛋白質とをＳＤＳ－ＰＡＧＥにより分析後比較検討した。その結果を図５及び図６に示す。図より、明らかに高分子量（６０ＫＤ以上）に違いが認められ、リポソーム懸濁液により蛋白質が抽出されていることが判明した。

【００２５】実施例５　　抽出条件の最適化による味覚の選択的マスキング：一般に、塩・酸・苦味は舌上脂質膜へ作用して発現する味といわれ、他方甘・うま味は舌上に存在すると考えられる受容蛋白質に作用して発現する味であると考えられている。そこで、舌上脂質を傷つけず舌上の受容蛋白質を主に抽出するリポソーム抽出法について実施例２に挙げたリポソームを用い検討を行なった。結果を図７に示す。その結果、抽出時間を３０分として抽出を行なえば抽出直後について甘味だけを選択的にマスキングできることが分かった。

【図面の簡単な説明】

【図１】実施例３において、本発明抽出剤の処理前後でＬ－アラニン刺激した場合の神経電位の変化量を示す図である。

【図２】実施例３において、本発明抽出剤の処理前後でシュークロース刺激した場合の神経電位の変化量を示す図である。

【図３】実施例３において、本発明抽出剤の処理前後でキニーネ塩酸塩刺激した場合の神経電位の変化量を示す図である。

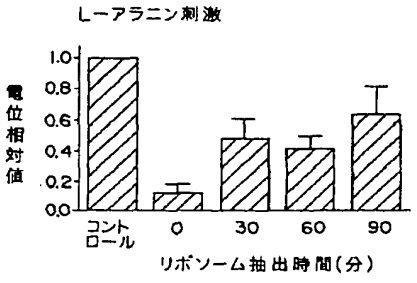
【図４】実施例３において、本発明抽出剤の処理前後でＬ－ロイシン刺激した場合の神経電位の変化量を示す図である。

【図５】実施例４において、舌をイオン交換水で洗浄して得た蛋白質の分析結果を示す図である。

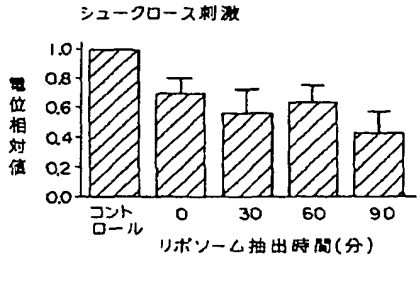
【図６】実施例４において、本発明抽出剤により、抽出された蛋白質の分析結果を示す図である。

【図７】実施例５において、本発明抽出剤による味覚の選択的マスキングの結果を示す図である。

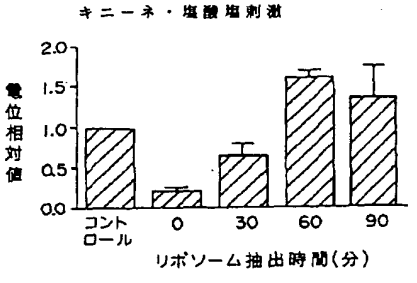
【図１】



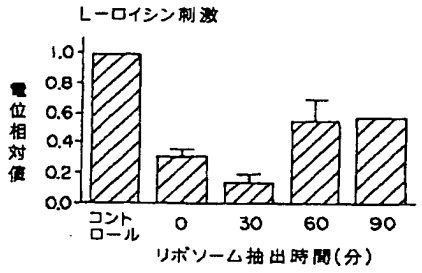
【図２】



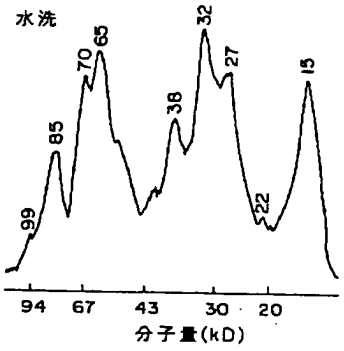
【図３】



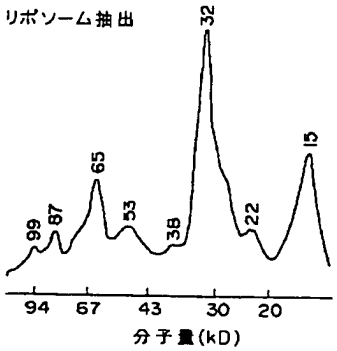
【図４】



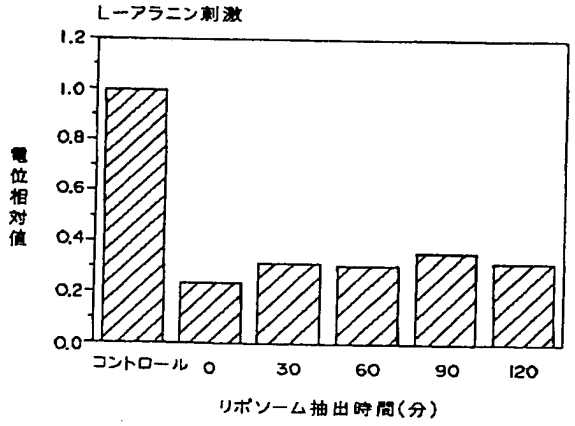
【図５】



【図６】



【図７】



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